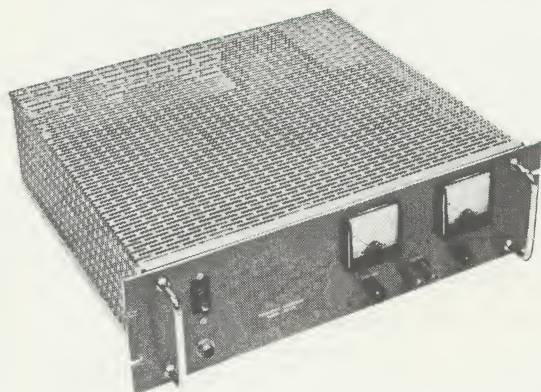


Solid State FREQUENCY CONVERTERS

BULLETIN NO. SFC67



CRS SERIES—400~ OUTPUT

OUTPUT

Voltage: Adjustable 105-125 volts, single phase

Voltage and Frequency Regulation: 0.5%

Harmonic Distortion: Less than 1%

Model	Output VA	*45-65 Cycle Input Single Ø Volts	Dimensions HxWxD
CRS-50	50	105-125	5¼x19x10
CRS-100	100	105-125	5¼x19x10
CRS-250	250	105-125	5¼x19x15
CRS-500	500	105-125	10½x19x16
CRS-1000	1000	105-125	15¾x19x16
CRS-2000	2000	210-250	2 sections, each: 15¾x19x18

*350-450 cycle input also available.

LRS SERIES—60~ OUTPUT

OUTPUT

Voltage: Adjustable 105-125 volts, single phase

Voltage and Frequency Regulation: 0.5%

Harmonic Distortion: Less than 3%

Model	Output VA	**350-450 Cycle Input Single Ø Volts	Dimensions HxWxD
LRS-200	200	105-125	7x19x15
LRS-500	500	105-125	12¼x19x16
LRS-1000	1000	105-125	21x19x16
LRS-2000	2000	210-250	2 sections, each: 21x19x18

**45-65 cycle input also available.

CRS SERIES—400 CYCLE OUTPUT

LRS SERIES— 60 CYCLE OUTPUT

- 50 to 2000VA Output
- 0.5% Voltage & Frequency Regulation
- Low Distortion Sine Wave Output
- Full VA into BOTH CAPACITIVE & INDUCTIVE LOADS
- High Efficiency Switched Mode Operation
- Adjustable Output Voltage
- Complete Overload & Short Circuit Protection
- Input to Output Isolation
- Provision for Frequency Synchronization

CUSTOM REQUIREMENTS

Modified frequency converters are also available having the following features:

- > Two Phase or Three Phase Output Configurations.
- > Square Wave Outputs.
- > Fixed Frequency Stabilities to $\pm 0.001\%$.
- > Adjustable Output Frequencies.
- > Special Input and/or Output Voltages.
- > Modular Housings.

Modified units, which embody the same proven techniques and reliability as the fine catalog models, are available on a short delivery basis.



SPECIFICATIONS:

Output Configuration: Single Phase, Two Wire, Isolated.

Input Configuration: Single Phase, Two Wire, Isolated.

Output Voltage: Adjustable 105-125 Volts RMS.

Voltage Regulation:

Load: Within 0.5% for No Load to Full Load Change.

Line: $\pm 0.5\%$ for rated Input Line Change.

Frequency Regulation:

Load: Within 0.5% for No Load to Full Load Change.

Line: $\pm 0.25\%$ for rated Input Line Change.

Units providing Frequency Regulation and Stability to $\pm 0.001\%$ available on Special Order as are units in which the Frequency may be synchronized with an external source.

Harmonic Distortion: 1% for 400 Cycle Models, 3% for 60 Cycle Models when Powering Linear (resistive or reactive) Loads; Slightly Higher into Switching Type Loads.

Load Power Factor: 0.7 Lead or Lag to Unity at Rated Output; wider Power Factor Range with slight derating.

Ambient Temperature:

Operating: -20°C to $+50^{\circ}\text{C}$.

Storage: -40°C to $+85^{\circ}\text{C}$.

Cooling:

CML Frequency Converters require no auxiliary cooling. There is no need for special base plate heat sinks. Units rated at 500VA to 2000VA include quiet built-in fan.

Temperature Stability:

Frequency: Max. 0.05%/Degree C.

Voltage: Max. 0.01%/Degree C.

Construction:

Standard models furnished as rack mount equipment with full dust covers. Modified rack mount or modular supplies packaged in accordance with customer specification are also available.

Slides available on special order.

Controls & Meters:

All models include input circuit breaker and output voltage adjust. Output voltmeter and ammeter standard on all models. However units may be ordered without one or both meters.

Input & Output Terminations:

Output connections via 5-way Binding Posts on front panel (ground terminal included). Rear terminals available as option when ordering.

Input connections via barrier strip at the rear of unit.

DESIGN FEATURES:

The CRS and LRS SERIES of SOLID STATE FREQUENCY CONVERTERS, highly regulated and highly compact, feature electrical characteristics far exceeding those normally found in switching type Frequency Converters. All models are rated for continuous duty operation into leading as well as lagging power factor loads. CML Converters therefore provide the flexibility so often needed for systems applications, where the load may vary from capacitor-input-filters (leading power factor) to switching-regulators or motor loads (lagging power factor). CML's proprietary power filter designs provide low distortion sine wave. This feature, coupled with precise control of output frequency and voltage, is ideally suited for equipment calibration and gyro spin-motor applications.

Transistorized Power Stages

The power generating stages of all CML models utilize transistors exclusively, rather than Silicon Controlled Rectifiers, thereby insuring positive, controlled turn-off and turn-on characteristics—essential for reliable, continuous, non-interrupted operation into leading and lagging power factor loads as well as non-linear full-wave and half-wave switching loads. Sudden line and load changes do not cause power interruption.

Component Derating

Conservative design and component selection is typical of all CRS and LRS models. Semiconductors are derated by 50%, capacitors 25%, transformers 20%, and resistors 40% from manufacturers' published ratings for both steady state and transient worst case conditions.

Protective Circuits

All models rated at 200VA and above are protected against overload or output short circuit by a quick acting sensing-comparator circuit which continuously compares the output current with an internal standard. Upon the application of an overload in excess of a pre-set limit, the output voltage will immediately fall to zero. In the event of an internal fault, the input circuit breaker will trip. A front panel overload reset is provided.

50 and 100VA models include input circuit breaker and output fuse for protection against overload and internal fault.

All CRS and LRS models include complete over-temperature protection. If safe temperature limits are exceeded the output voltage will fall to zero. The output voltage automatically returns to its normal condition once the internal temperature returns within safe limits.

CML Representatives and the Application Engineering Staff at the Home Office are always happy to discuss applications, to recommend particular types of Frequency Converters and to provide detailed test data under various operating conditions.



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POWER AMPLIFIERS

BULLETIN NO. SPG 67

THE *New* COMPACT "SPG" SERIES

WIDE BAND POWER AMPLIFIERS for AUDIO and ULTRASONIC TESTING

- 1KVA TO 200KVA
- AIR COOLED & VAPOR COOLED MODELS



MODEL A5K
5KVA OUTPUT
33"H x 17"W x 17"D



MODEL A20K
20KVA OUTPUT
48"H x 68"W x 24"D
(Unit shown with special base
for shipboard installation)

- IDEAL FOR CW AND PULSED DUTY
- ± 0.5 DB FREQUENCY RESPONSE
- INSTANTANEOUS OVERLOAD PROTECTION WITH FRONT PANEL RESET
- LOW DISTORTION
- FULL POWER INTO REACTIVE LOADS
- RUGGED CONSTRUCTION FOR MARINE OR AIRBORNE INSTALLATIONS

APPLICATIONS

SONAR TESTING — HIGH INTENSITY ACOUSTIC SYSTEMS — VIBRATION TEST
PLASMA TUBES — INDUSTRIAL PROCESS CONTROL — INDUCTION HEATING



SPG SERIES — WIDE BAND POWER AMPLIFIERS

MODEL	OUTPUT POWER	LOAD POWER FACTOR RANGE AT RATED KVA	STANDARD OUTPUT IMPEDANCE TAPS	*CABINET DIMENSIONS H x W x D	TYPE OF COOLING
	KVA		OHMS	INCHES	
A1K	1KVA	±0.4 to Unity	4/16/36/64/144/576	25 x 19 x 22	FORCED AIR ↓
A2K	2	±0.4 to Unity	4/16/36/64/144/576	25 x 19 x 22	
A5K	5	±0.4 to Unity	100/300/500/700	33 x 17 x 17	
B5K	5	±0.1 to Unity	8/32/72/128/288/1152	45 x 24 x 24	
A10K	10	±0.1 to Unity	16/64/144/256/576/2304	48 x 68 x 24	
A20K	20	±0.3 to Unity	16/64/144/256/576	48 x 68 x 24	
VA30K	30	±0.1 to Unity	16/64/144/256/576	72 x 72 x 36	VAPOR COOLED ↓
VA50K	50	±0.4 to Unity	16/64/144/256/576	72 x 72 x 36	
VA100K	100	±0.1 to Unity	16/64/144/256	2 sections, ea.: 90 x 72 x 57	
VA200K	200	±0.1 to Unity	16/64/144/256	3 sections, ea.: 90 x 72 x 57	

*Models A1K and A2K are available as standard 19" rack mount models or as bench models.
All other models are furnished complete in cabinet enclosures. Models A5K and B5K include casters.

SPECIFICATIONS — STANDARD SPG SERIES

OUTPUT FREQUENCY: Standard full power frequency range is 100-10,000 cps. Other frequency ranges between 5 cps and 200KC are available on a custom basis.

OUTPUT CONFIGURATION: 2 wire floating; model A5K (only)
2 wire, one side grounded.

DUTY CYCLE: Continuous duty at full rated output power. Please consult CML for pulsed or intermittent duty ratings.

FREQUENCY RESPONSE: ±0.5 db, 100-10,000 cps.

HARMONIC DISTORTION: Less than 3%, 100-10,000 cps; less than 1.5% mid-band.

HUM AND NOISE: At least 60 db below rated output tap voltage.

OUTPUT IMPEDANCE SELECTION: Taps are selected by link change.
Front panel tap select switches are available at additional charge.

INPUT SERVICE: Models rated 1KVA to 20KVA require 208/230 volts, 3 phase, 60 cycles. Larger models require 440/460/480 volts, 3 phase, 60 cycles—higher input voltages available on special order.

SIGNAL INPUT VOLTAGE: 1.0 volt RMS for rated output.

SIGNAL INPUT IMPEDANCE: 600 ohms, single ended.

KEYED OPERATION: All models are suitable for operation with keyed input signals.

METERING: All models include complete front panel metering. In addition, models rated at 5KVA to 200KVA have recessed front panel section with test points for critical circuit parameters—to keep down-time to a minimum.

PROTECTIVE CIRCUITS: CML instantaneous overload circuitry protects both amplifier and load. Rapid front panel reset permits return to normal operation with minimum down-time.

FINISH: Panels are satin green enamel; cabinets are green armor-hide. Special colors are available on a custom basis.

VAPOR COOLING

All CML models rated at 30KVA output or higher feature modern vapor cooling systems to dissipate heat generated in the "final" amplifier. Use of this method, with its high efficiency heat transfer, reduces "raw water" requirements appreciably when compared with older "water cooled systems." In addition, it eliminates the need for a pump in the closed loop cooling system and greatly reduces contamination of distilled water in the closed system—thus greatly reducing maintenance.



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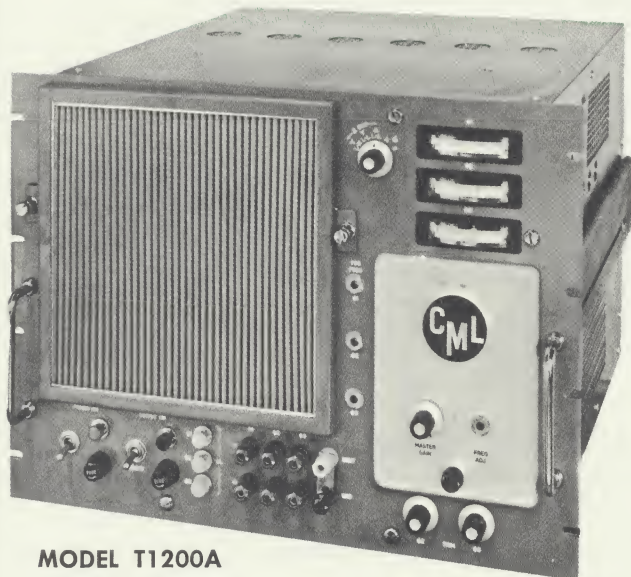
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THREE PHASE FREQUENCY CONVERTERS

BULLETIN NO. TEC 65



MODEL T1200A
1200VA OUTPUT

THE *New* COMPACT "A" SERIES

AN OUTSTANDING COMBINATION of POWER, PERFORMANCE and PACKAGING

- 11 FREQUENCY CONVERTERS ARE AVAILABLE . . . 30VA to 15KVA
- MINIMUM PACKAGE SIZES . . . 2500VA in 14" rack height; 500VA in 8 3/4" rack height
- INTERCHANGEABLE PLUG-IN OSCILLATORS . . . 16 standard oscillators are available—to provide fixed or adjustable output frequencies between 45 and 6,000 cps and stabilities to $\pm 0.001\%$
- INSTANTANEOUS OVERLOAD PROTECTION . . . An overload of any one phase causes complete output shut-down, protecting 3 phase load
- DUAL OUTPUT VOLTAGE FOR Δ OR Y LOADS . . . Adjustable voltages 0-125 volts line-to-line as well as 0-217 volts line-to-line are presented at output terminals; output is isolated for maximum versatility
- CONSTANT VOLTAGE OUTPUT . . . 0.5% regulation for no load to full load change—response time less than 50 microseconds
- OUTPUT VOLTAGE UNAFFECTED BY UNBALANCED LOADS

GENERAL INFORMATION

The new "A" series of Three Phase Frequency Converters are exceptionally versatile sources of AC power. Each converter consists of a regulated **THREE PHASE AMPLIFIER** with interchangeable fixed or variable frequency **PLUG-IN OSCILLATORS** for a wide range of precision AC power applications. The amplifier has a full power range of 45-6,000 cps. With the incorporation of a CML plug-in oscillator (which includes 120° phase shift network) precise fixed or adjustable frequencies are available anywhere within this range. Plug-in oscillators are Wein bridge or tuning-fork controlled for frequency stabilities ranging between $\pm 0.25\%$ and $\pm 0.001\%$. Dual output taps are standard for matching either Delta or Wye loads (output may be connected either 120 volts line-to-line or 208 volts line-to-line). Precise amplitude stability and low harmonic content are provided by a combination of positive current feedback and inverse voltage feedback. With these combined features, the series A converters are versatile precision instruments designed to meet a vast number of applications from production checkout to R&D testing. Their rugged and compact construction makes them ideal for airborne and shipboard applications as well.



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Note!

STANDARD CML FREQUENCY CONVERTERS consist of THREE PHASE AMPLIFIER + PLUG-IN OSCILLATOR

THREE PHASE AMPLIFIERS

MODEL	3Ø OUTPUT POWER VA	INPUT	*DIMENSIONS		
			H	W	D
T30A	30	115V, 1Ø, 47-65~	7	19	19
T150A	150	115V, 1Ø, 47-65~	7	19	19
T300A	300	115V, 1Ø, 47-65~	8 3/4	19	22
T500A	500	115V, 1Ø, 47-65~	8 3/4	19	22
T750A	750	208/230V, 3Ø, 47-65~	14	19	22
T1200A	1,200	208/230V, 3Ø, 57-65~	14	19	22
T1750A	1,750	208/230V, 3Ø, 47-65~	14	19	22
T2500A	2,500	208/230V, 3Ø, 47-65~	14	19	22
T5000A	5,000	208/230V, 3Ø, 57-65~	45	24	24
T10000A	10,000	208/230V, 3Ø, 57-65~	57	28	28
T15000A	15,000	208/230V, 3Ø, 57-65~	77	33	33

*30VA to 2500VA units are available as either rack mount or bench models with dimensions as shown above.

5000VA to 15000VA units are cabinet models including casters.

Plug-in OSCILLATORS

3Ø OUTPUT FREQUENCY	← FREQUENCY STABILITY →			
	±0.25 %	±0.1 %	±0.01 %	±0.001 %
MODEL #				
Fixed 400 cps	SG-34A	SG-34B	SG-34E	SG-34G
Fixed 60 cps	SG-32A	SG-32B	SG-32E	Special Order
Fixed 50 cps	SG-31A	SG-31B	SG-31E	Special Order
Adjustable, 350-450 cps	SG-35A	SG-35B	X	X
Adjustable, 45-70 cps	SG-33A	SG-33B	X	X
Adjustable, 300-2,000 cps	SG-36A	X	X	X
Adjustable, 45-6,000 cps	SG-37A	X	X	X

SPECIFICATIONS—STANDARD FREQUENCY CONVERTER MODELS

OUTPUT CONFIGURATION: Three Phase, 4 wire wye, neutral floating.

OUTPUT VOLTAGE: 0-125 Volts line-to-line and 0-217 Volts line-to-line; both sets of terminals are presented at output. Full power available at output of 110-125 volts and 190-217 volts.

DUTY CYCLE: Continuous duty at full rated output.

OUTPUT POWER: Rated output power for each model is shown in chart above. Maximum power per phase is 1/3 of 3Ø output.

VOLTAGE REGULATION: Less than 0.5% for no load to full load change. ±0.5% for ±5% input voltage change.

LOAD POWER FACTOR: 0.7 lead or lag to unity at rated output; wider power factor range with slight derating.

UNBALANCED PHASE LOADING: Separate power amplifiers and regulation circuits are provided for each output phase. Therefore unbalanced phase loading has negligible effect as long as the rated output power per phase is not exceeded.

PROTECTIVE CIRCUITS: All models are equipped with instantaneous overload protection and front panel reset. An overload in any output phase causes all phases to shut down, thus protecting 3Ø loads. Front panel lamps also indicate which phase has been overloaded.

OUTPUT & INPUT TERMINATIONS: Output terminals are furnished both front and rear, five way binding posts on front, barrier strip on rear. Input is via rear mounted barrier strip.

FREQUENCY RANGE: Each amplifier model is rated at full power 45-6,000 cps; the operating frequency range is determined by the particular plug-in oscillator which is selected. Standard oscillator frequencies are tabulated above.

FREQUENCY STABILITY: Determined by the particular plug-in oscillator which is selected. Stabilities of standard oscillators are tabulated above.

RESPONSE TIME: Less than 50 microseconds.

WAVE SHAPE: Sine Wave.

HARMONIC DISTORTION: Less than 3% over the entire 45-6,000 cycle amplifier range; less than 1% mid-band.

HUM AND NOISE: 60 db below maximum output voltage.

OUTPUT PHASE SEPARATION: 120±1° for fixed frequency models as well as 350-450 cycle models. 120±2° for 45-70 and 300-2,000 cycle models. 120±3° for 45-6,000 cycle models.

METERS: Models rated 30VA to 500VA are furnished with output voltmeter and selector switch to monitor any line-to-line and line-to-neutral voltage. Models rated 750VA to 15KVA have three (3) combination output voltmeter/plate current ammeters with selector switch to monitor any line-to-line and line-to-neutral output voltage as well as plate current of 3Ø amplifier.

CONSTRUCTION: Standard Models rated 30VA to 2500VA are available in standard 19" rack mount configuration or as bench models. Both styles are furnished with complete dust covers. Side support is recommended for all rack mount models—slides are offered as optional accessories. Standard 5KVA to 15KVA models are furnished complete in cabinet enclosures with casters.

FINISH: Panels are satin green enamel; cabinets are green armorhide. Special colors are available on a custom basis.

ORDERING INFORMATION

All Standard Frequency Converters may be ordered directly from the catalog by specifying both the Three Phase Amplifier model and the Required Plug-in model (or models). Thus, a 500VA Frequency Converter having an output frequency of 350-450 cps with a frequency stability of ±0.1% is specified as a Model T500A Amplifier with Model SG-35B Oscillator.

When ordering models rated at 30VA to 2500VA please specify whether Rack Mount or Bench Model is required.

SEPARATE PLUG-IN OSCILLATORS: When ordering Plug-in Oscillators as separate items it is necessary to specify which Amplifier Model or Models the oscillator is to be used with. All oscillators for 30VA to 500VA Models are interchangeable. A second set of oscillators are interchangeable for all models between 750VA and 15KVA.

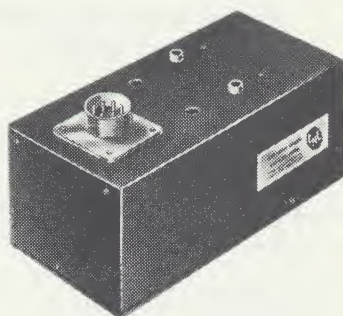


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Transistorized DC to AC POWER INVERTERS

BULLETIN NO. DA67



MRS Series—60 ~

Output: 115 Volts rms, Single Phase

Input: 22-30 Volts D.C.

Voltage & Frequency Regulation: 0.5 %

Model	Output VA	Dimensions HxWxD	Net Wt. Lbs. (Approx.)
MRS-500	500	12"x14"x14"	150
MRS-1000	1000	14"x17"x19"	175
MRS-2000	2000	17"x17"x19"	300

MNS Series—60 ~

Output: 105/115/125 Volts rms, Single Phase

Input: 22-30 Volts D.C.

Frequency Regulation: 0.5 %

Model	Output VA	Dimensions HxWxD	Net Wt. Lbs. (Approx.)
MNS-50	50	5"x11"x11"	28
MNS-100	100	5"x11"x11"	28
MNS-500	500	8"x14"x14"	80
MNS-1000	1000	14"x17"x19"	162
MNS-2000	2000	17"x17"x19"	280

DRS Series—400 ~

Output: 115 Volts rms, Single Phase

Input: 22-30 Volts D.C.

Voltage & Frequency Regulation: 0.5 %

Model	Output VA	Dimensions HxWxD	Net Wt. Lbs. (Approx.)
DRS-52*	50	5"x11"x8"	25
DRS-50	50	5"x11"x8"	25
DRS-100	100	5"x11"x8"	26
DRS-500	500	8"x14"x16"	70
DRS-1000	1000	14"x17"x18"	160
DRS-2000	2000	17"x17"x19"	290

*Input Voltage of Model DRS-52 is 10-14 Volts.

MRS SERIES—60 Cycle Output

Voltage & Frequency Regulated.

MNS SERIES—60 Cycle Output

Frequency Regulated, Voltage Unregulated.

DRS SERIES—400 Cycle Output

Voltage & Frequency Regulated.

- 50 to 2000VA Output
- Low Distortion Sine Wave
- Highly Regulated
- Reliable
- Quiet Operation
- Overload & Short Circuit Protection
- Protected Against Input Polarity Reversal
- High Efficiency
- Input to Output Isolation
- No Auxiliary Cooling Required

CUSTOM REQUIREMENTS:

Modified or custom supplies which embody many techniques incorporated in the fine catalog units described above are also available on a relatively short term delivery basis. We invite your inquiries regarding completely militarized power supplies and those requiring special frequency/voltage configurations.



SPECIFICATIONS:

Input Configuration: Two Wire, Isolated.

Output Configuration: Single Phase, Two Wire Isolated.

Output Voltage: MRS & DRS Models are preset at 115 Volts RMS. MNS Models have Taps available at 105/115/125 Volts RMS—These Values measured at nominal input voltage with Half Load.

Duty Cycle: Continuous Duty at Full Rated Output.

Harmonic Distortion: 1% for 400 Cycle Models, 3% for 60 Cycle Models when Powering Linear (resistive or reactive) Loads; Slightly Higher into Switching Type Loads.

Load Power Factor: 0.7 Lead or Lag to Unity at Rated Output; wider Power Factor Range with Slight Derating.

Frequency Regulation:

Load: 0.5% for No Load to Full Load Change.

Line: 0.5% for Rated Input Line Change.

Units providing Frequency Regulation and Stability to $\pm 0.001\%$ available on Special Order as are units in which the Frequency may be synchronized with an external source.

Voltage Regulation:

MRS & DRS Series:

Load: 0.5% for No Load to Full Load Change.

Line: 0.5% for Rated Input Line Change.

MNS Series:

Load: Approximately 6% for Half Load to Full Load Change.

Line: Approximately Proportional to Input Line Change.

Ambient Temperature:

Operating: -20°C to $+50^{\circ}\text{C}$.

Storage: -40°C to $+85^{\circ}\text{C}$.

Temperature Stability:

Frequency: Max. 0.05%/Degree C.

Voltage: MRS & DRS Series Max. 0.01%/Degree C.

MNS Series Max. 0.03%/Degree C.

Protective Circuits:

50 & 100 VA Models have input and output fuses. Input fuse will blow on application of input polarity reversal. 500 to 2000 VA Models have circuit breaker protection against overload, shorted output, DC overvoltage and overtemperature. Protection is also provided for DC polarity reversal.

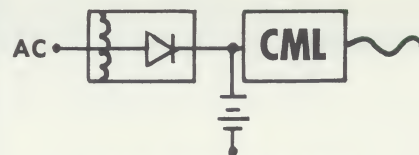
Cooling: CML Inverters require no auxiliary cooling. There is no need to provide special base plate heat sinks. Units rated at 500 to 2000 VA include quiet built-in fan.

Housing: Two Part Modular Housings with heat radiating finish.

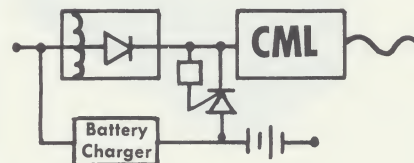
Mounting: Tapped Inserts are provided for Base Mount.

Input-Output Termination: 50 & 100 VA Models have quick disconnect on top surface. Mating Connector is furnished with inverter (Dimensions listed are plus connector). 500 to 2000 VA units have terminals accessible via removable top Cover Plate.

APPLICATIONS:



FLAME SENSOR & ALARMS
AIRCRAFT 60 CPS POWER
MARINE COMMUNICATIONS
FLUORESCENT LIGHTING



MICROWAVE SYSTEM AC
HOSPITAL EMERGENCY AC
PRECISION MOTOR SPEED
MOBILE INSTRUMENT AC



SONAR DRIVER UNITS
ASTRONAUT SUIT COOLING
TORPEDO GYRO DRIVE
FUEL CELL INVERTERS

CML Representatives and the Application Engineering Staff at the Home Office are always happy to discuss applications, to recommend particular types of Inverters, and to provide detailed test data under various operating conditions.

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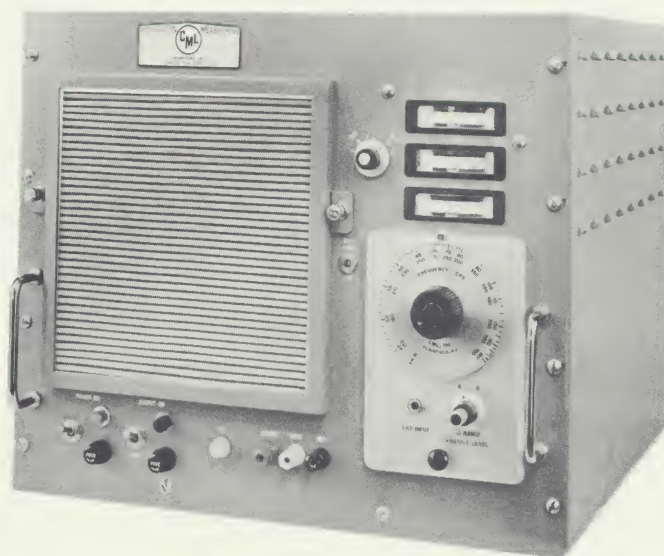
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SINGLE PHASE AC POWER SUPPLIES

BULLETIN NO. EPS-65



Model N1000A
1000 VA OUTPUT

THE COMPACT "NA" SERIES REGULATED POWER AMPLIFIERS with PRECISION PLUG-IN OSCILLATORS

- **8 POWER SOURCES ARE AVAILABLE** . . . 300VA to 15KVA
- **MINIMUM PACKAGE SIZES** . . . 2000VA in 14" rack height; 500VA in 8 3/4" rack height.
- **CONSTANT VOLTAGE OUTPUT** . . . 0.5% regulation for no load to full load change—response time less than 50 microseconds
- **EXCEPTIONAL VERSATILITY** . . . each Model can be operated either as a precision AC Power Supply or as an Audio Power Amplifier
- **INTERCHANGEABLE PLUG-IN OSCILLATORS** . . . 16 standard oscillators are available—to provide fixed or adjustable output frequencies between 45 and 6,000 cps and stabilities to $\pm 0.001\%$
- **INSTANTANEOUS OVERLOAD PROTECTION**

The NA SERIES of AC POWER SUPPLIES are exceptionally flexible sources of audio power. Each power supply consists of a **REGULATED AUDIO POWER AMPLIFIER** with interchangeable fixed or variable **PLUG-IN OSCILLATORS** for a wide range of precision AC power applications. The Amplifier has a full power range of 45-6,000 cycles. With the incorporation of a CML Plug-in Oscillator precise fixed or adjustable output frequencies are available anywhere within this range. Plug-in Oscillators are Wein Bridge or Tuning Fork controlled for frequency stabilities ranging between $\pm 0.25\%$ and $\pm 0.001\%$. Plug-in Oscillators also feature a front panel jack for external signal drive. Each Power Amplifier model may also be operated without a plug-in oscillator; however, in that case, the Model SA-2 External Signal Adapter is required.

Precise amplitude stability and low harmonic content are provided by a combination of positive current feedback and inverse voltage feedback. With these combined features, the Series NA Power Supplies are versatile precision instruments designed to meet a vast number of applications from Production Checkout to R&D testing. Their rugged and compact construction make them ideal for airborne and Shipboard applications as well.



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REGULATED POWER AMPLIFIERS

MODEL	OUTPUT POWER	INPUT	*DIMENSIONS H x W x D
	VA		
N300A	300	115V, 1Ø, 47-65~	8 3/4 19 22
N500A	500	115V, 1Ø, 47-65~	8 3/4 19 22
N750A	750	208/230V, 3Ø, 47-65~	14 19 22
N1000A	1,000	208/230V, 3Ø, 57-65~	14 19 22
N1500A	1,500	208/230V, 3Ø, 47-65~	14 19 22
N2000A	2,000	208/230V, 3Ø, 47-65~	14 19 22
N5000A	5,000	208/230V, 3Ø, 57-65~	45 24 24
N15000A	15,000	208/230V, 3Ø, 57-65~	47 34 24

*300VA to 2000VA units are available as either rack mount or bench models with dimensions as shown above.

5000 VA and 15,000 VA units are cabinet models.

Model N5000A includes casters.

SPECIFICATIONS

OUTPUT CONFIGURATION: Single Phase, 2 wire floating.

OUTPUT VOLTAGE: Adjustable 0-125 Volts; full power available at output of 110-125 Volts.

DUTY CYCLE: Continuous duty of full rated output.

OUTPUT POWER: Rated output power for each model is shown in chart above.

VOLTAGE REGULATION: Less than 0.5% for no load to full load change. $\pm 0.5\%$ for $\pm 5\%$ input voltage change.

LOAD POWER FACTOR: 0.7 lead or lag to unity at rated output; wider power factor range with slight derating.

OUTPUT WAVE SHAPE: Sine wave. Less than 3% total harmonic distortion over the 45-6,000 cycle frequency range. Less than 1% mid-band.

RESPONSE TIME: Less than 50 microseconds.

HUM and NOISE: 60 db below maximum output voltage.

PROTECTIVE CIRCUITS: All models are equipped with instantaneous overload protection and front panel reset.

METERS: All standard models are furnished with front panel meters to monitor output voltage and plate currents of final amplifier tubes.

FREQUENCY RANGE: Each amplifier model is rated at full power 45-6000 cps with the exception of the Model N15000A which is rated at full power 200-6,000 cps. Each model may be driven from an external signal source over the rated

Plug-in OSCILLATORS

OUTPUT FREQUENCY	FREQUENCY STABILITY			
	$\pm 0.25\%$	$\pm 0.1\%$	$\pm 0.01\%$	$\pm 0.001\%$
MODEL #				
Fixer 400 cps	SG-14A	SG-14B	SG-14E	SG-14G
Fixed 60 cps	SG-12A	SG-12B	SG-12E	Special Order
Fixed 50 cps	SG-11A	SG-11B	SG-11E	Special Order
Adjustable 350-450 cps	SG-15A	SG-15B	X	X
Adjustable 45-70 cps	SG-13A	SG-13B	X	X
Adjustable 300-2,000 cps	SG-16A	X	X	X
Adjustable 45-6,000 cps	SG-17A	X	X	X

All Plug-In Oscillators are provided with a jack for external signal drive.

EXTERNAL SIGNAL ADAPTER	
45-6,000 cps	Model SA-2

frequency range. When driven by a PLUG-IN OSCILLATOR the output frequency range is determined by the particular plug-in which is selected. Standard oscillator frequencies are tabulated above.

FREQUENCY STABILITY: Determined by the plug-in oscillator or external signal source which is utilized. Stabilities of standard plug-in oscillators are tabulated above.

EXTERNAL SIGNAL: Signal input voltage of 5 volts rms required for full rated output. Signal input impedance 600 ohms, single ended.

OUTPUT & INPUT TERMINATIONS: Output terminals are furnished both front and rear, five way binding posts on front and barrier strip on rear. Input power termination is rear mounted barrier strip. Signal input is via jack mounted on front panel of plug-in oscillator or Model SA-2 External Signal Adapter.

CONSTRUCTION: Standard Models rated 300VA to 2000VA are available in standard 19" rack mount configuration or as bench model. Both styles include complete dust covers. Side support is recommended for rack mount models—Slides are available as optional accessories. 5KVA & 15KVA Models are furnished complete in cabinet enclosures. Standard Model N5000A is mounted on casters.

FINISH: Panels are satin green enamel; cabinets are green armor-hide; special colors are also available on a custom basis.

ORDERING INFORMATION

Standard A. C. POWER SUPPLIES may be ordered directly from the catalog by specifying both the POWER AMPLIFIER model and the required PLUG-IN OSCILLATOR model (or models). Thus, a 1000VA Power Supply with an output frequency of 350-450 cps and a frequency stability of $\pm 0.1\%$ is specified as a Model N1000A Amplifier with Model SG-15B Oscillator.

When ordering a Power Amplifier without a Plug-In Oscillator, the Model SA-2 EXTERNAL SIGNAL ADAPTER is required in order to provide signal input jack and gain control.

Please specify whether Rack Mount or Bench Model is required when ordering Models rated at 300VA to 2000VA.

SEPARATE PLUG-IN OSCILLATORS: When ordering Plug-in Oscillators as separate items it is necessary to specify which Amplifier Model or Models the oscillator is to be used with. All oscillators for 300VA to 500VA Models are interchangeable. A second set of oscillators are interchangeable for all models between 750VA and 15KVA.

TWO-PHASE OPERATION

All standard amplifiers may be used in pairs to provide a 2 phase output. Special 2 phase PLUG-IN OSCILLATORS are available with a 90° phase separation. Please contact the factory or your CML Representative for a quotation on TWO-PHASE PLUG-IN OSCILLATORS tailored to your exact requirements.



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